MONITORING, DATA LOGGING AND CONTROL SYSTEM MS5, MS5D

APPENDIXES

TO INSTRUCTION MANUAL

SYSTEM s.r.o.

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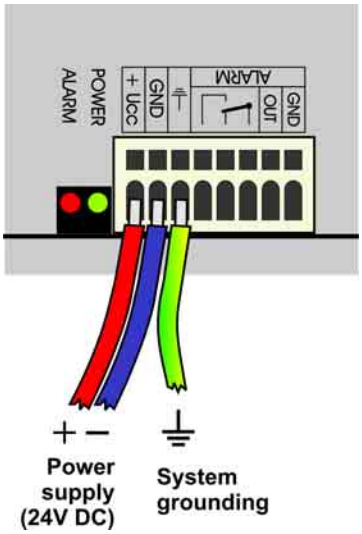
APPENDIX 1: Power input of data logger

1. Wiring of power connector



2. Parameters of power input

Power voltage of data logger is 24V DC. Consumption of data logger differs depending on kind of connected peripherals. Approximate values are in the below table. If output relay module will be connected to data logger, this voltage must be complied. Data logger itself is able to work at power voltage range (9..30)V DC. Always it is necessary to consider if A0 inputs will be installed before selection of power voltage. If it is to be, see, what lowest power voltage transmitters connected to this input need. Select data logger power voltage at least 3V higher than this. It is necessary to warn negative pole of power connector is galvanically connected to internal GND of data logger. Thus also with inputs (if galvanically not isolated) and with voltage of ALARM output.

Approximate maximum current consumption			
	Power 24V	*Power 9 V*	*Power 12V*
data logger MS5 without input modules	approximately 50 mA	*approximately 100 mA*	*approximately 80 mA*
data logger MS5D without input modules	approximately 70 mA	*approximately 180 mA*	*approximately 110 mA*
Input modules galvanically not isolated, CTU, CTK, FU, FK except A0	< 1 mA	*< 3 mA*	*< 3 mA*
Input module galvanically isolated and ac, RP, RS	approximately 10 mA	*approximately 35 mA*	*approximately 25 mA*
Input module A0*	20 mA max.	*20 mA max.*	*20 mA max.*
Output relay module, all relay closed	approximately 200 mA	---	---
Ethernet interface	approximately 40 mA	*approximately 35 mA*	*approximately 25 mA*
SMS communication modules	approximately 6 mA	*approximately 20 mA*	*approximately 15 mA*

*A0 short circuited at the input has approximatelly 28mA current consumption

3. System back-up in case of mains power failure

In case data logger function is necessary to back up during power mains failure, first specify the current consumption of the entire system. Then choose suitable back-up source in accordance with the required time of uninterrupted operation. If there is a need to inform operating staff or distant user on battery operation, then it is necessary to install binary input module S1 to any of input channels and connect it with the backup source output signalizing battery operation.

When installing power sources it is necessary to follow valid safety regulations and recommendations specified in instruction manuals of source manufactures. Leads to battery must be of suitable cross-section size. In back-up design it is necessary to consider allowed temperature source a battery.

Recommended back-up systems:

a) Back-up source AWZ224, manufacturer Pulsar sp.j., Poland

To this source it is necessary to buy two lead accumulators 12V/7Ah in hermetical maintenance-free type of construction, e.g. type ELNIKA 12V/7.2Ah. Source is designed for mounting to vertical inflammable wall with sufficient air flow. Its protection rate is IP20. It is not designed for mounting to closed switchboard. More details are described in manufacturer instruction manual.

This back-up source is able to supply data logger with transmitters of current consumption 200mA for approximately 35 hours. Discharged accumulators are recharged to full capacity in approximately 14 hours.

Make basic wiring in accordance with instruction manual of the manufacturer. Connect data logger this way: connect terminal **–OUT** of source to terminal **GND** of the power data logger connector, connect terminal **+OUT** of source to terminal **+Ucc**. In case information for data logger on battery operation is required, install input module S1 to data logger and connect second terminal **+OUT** of source to terminal **IN** of this input and connect source terminal **BS** to terminal **COM** of input S1. In user PC program state „OFF“ corresponds to „Mains operation“ and state „ON“ corresponds to „Battery operation“. User can be informed on switch-over to battery operation by suitable adjustment of conditions and alarms.

b) Back-up source MINI-DC-UPS/24DC/2 with batery MINI-BAT/24DC/1.3AH, manufacturer Phoenix Contact

This source is designed for mounting to 35mm DIN rail in data logger case MP033 and MP034. It contains two modules - UPS and battery. More details are described in manufacturer instruction manual.

This back-up source is able to supply data logger system with 200 mA consumption at least 3 hours, data logger system with 500 mA consumption at least 2 hours, data logger system with 1A consumption at least one hour. Discharged accumulators are recharged to full capacity in approximately 3 hours.

Make basic wiring in accordance with instruction manual of the manufacturer. Connect battery (without fuse) with proper polarity to terminal **+/- Battery,** connect output of source **–Out** to terminal GND of data logger power connector and source output **+Out** to data logger terminal **+Ucc**.

In case information for data logger on battery operation is required, install input module S1 to data logger and connect terminal **-OUT** of source to terminal **COM** of this input and connect source terminal **Bat.mode** to terminal **IN** of input S1. In user PC program state „OFF“ corresponds to „Mains operation“ and state „ON“ corresponds to „Battery operation“. User can be informed on switch-over to battery operation by suitable adjustment of conditions and alarms.

Example of backed up system:

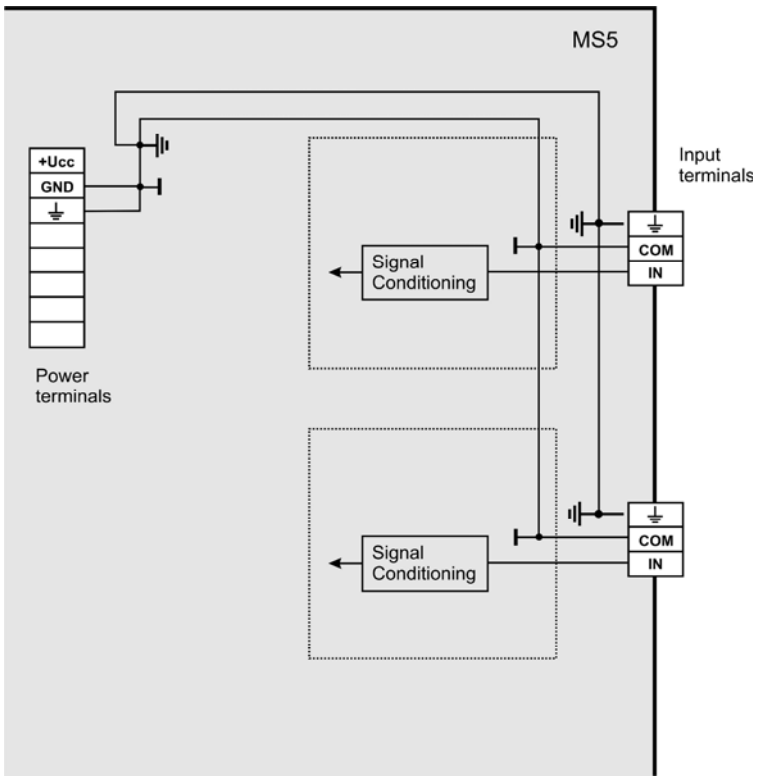
There is a requirement to back up data logger MS5D with 10 input modules K1 and 6 modules A0. Three T3110 transmitters are connected to inputs A0. Data logger is connected to LAN network via Ethernet interface and equipped with SMS module and external GSM modem Wavecom, powered from the same source as data logger.

Total consumption of the system: 70mA (MS5D) + 10x1mA (10xK1) + 6x20mA (6xA0) + 40mA (Ethernet interface) + 6mA (SMS module) + approximately 100mA (GSM modem) = 346 mA.

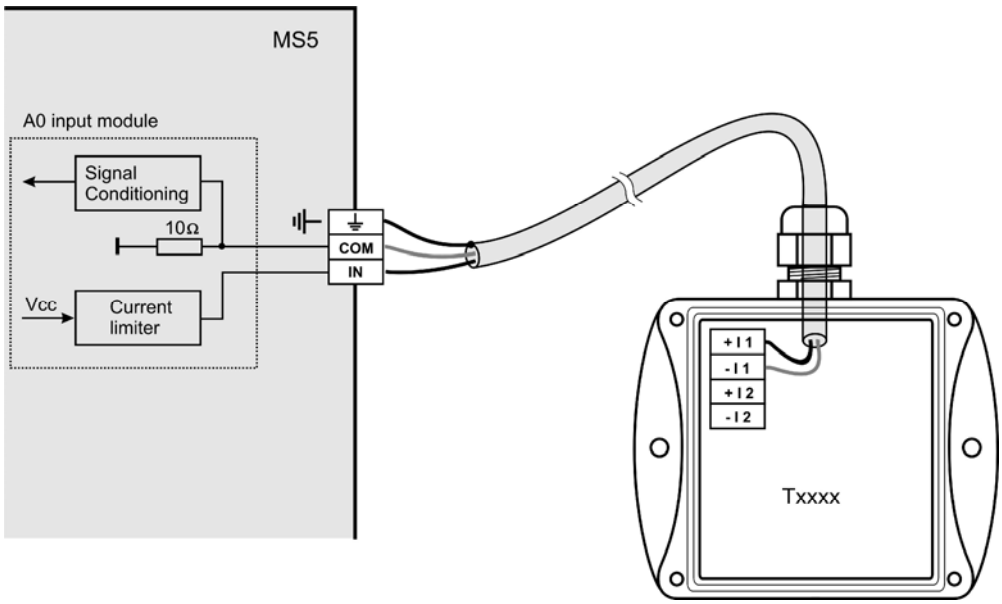
By means of back-up source AWZ224 we are able to reach up to approximately 20 hours of backed up operation, by means of system MINI-DC-UPS almost 3 hours of backed up operation. It is supposed in described calculation, no short-circuit of current loops at input A0 appears. In opposite case current approximately 28mA/input A0 must be calculated.

APPENDIX 2: Input circuits of data logger

1. Connection of earthing terminals in data logger with galvanically not isolated inputs

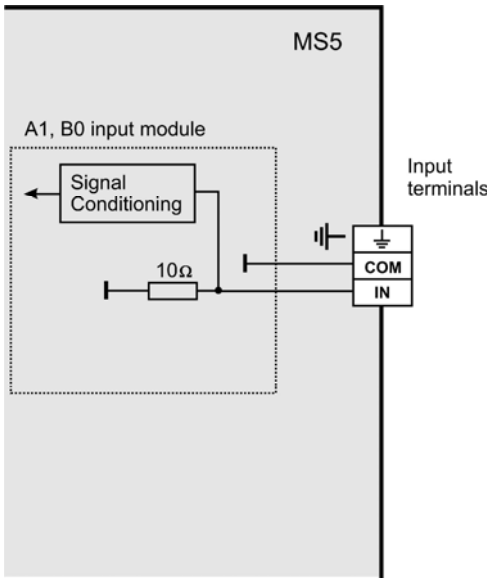


2. Input for two-wire connected passive transmitters - input type A0:



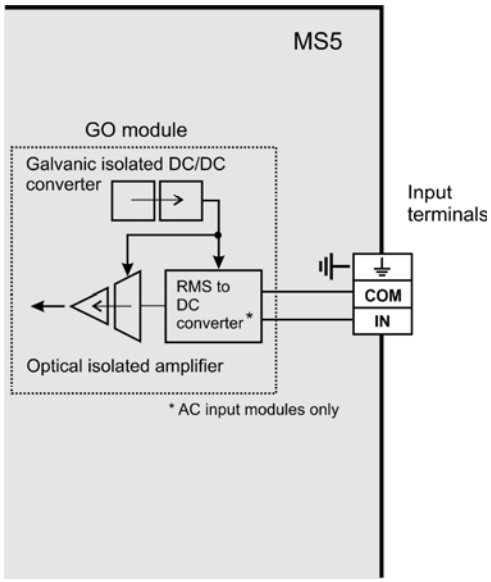
Note: *All temperature and humidity transmitters Comet are connectable this way.*

3. Input for measurement of current 0(4) to 20 mA



Inputs for measurement of higher currents (1A and 5A) differs by the value of shunt resistor. Voltage inputs have resistor divider instead of shunt resistor. Inputs for measurement of resistance have reference voltage via suitable resistor connected to the IN terminal.

4. Concept of galvanically isolated analog inputs



APPENDIX 3: Input module RP

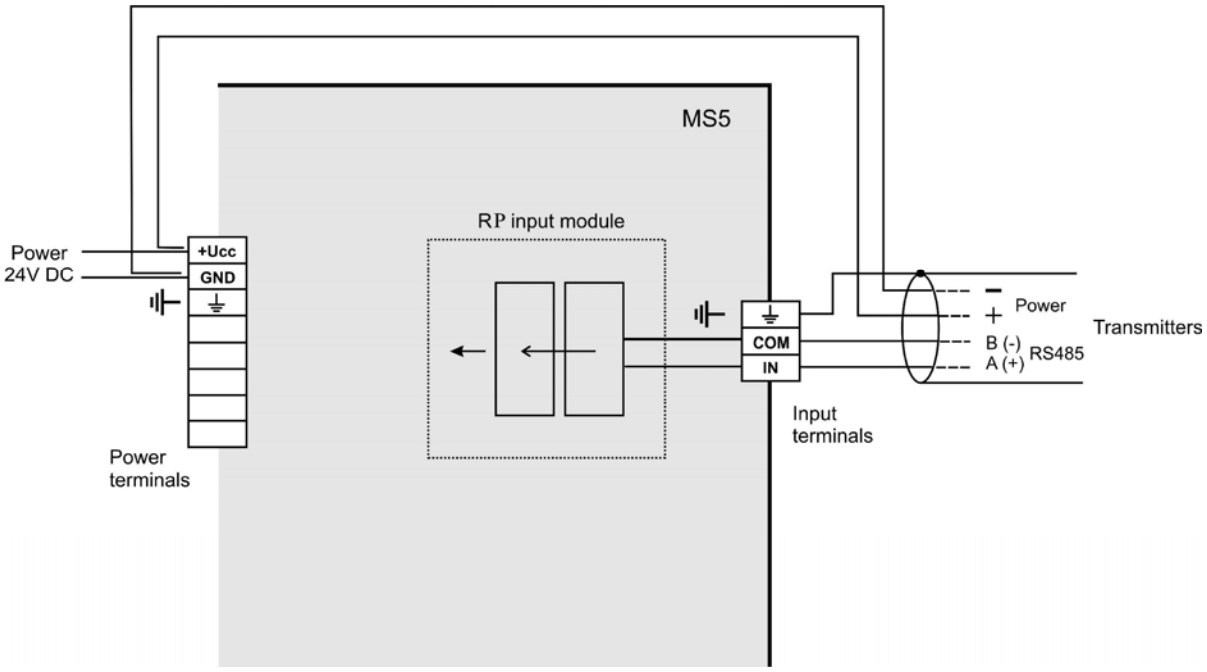
What can be connected to the RP input module:

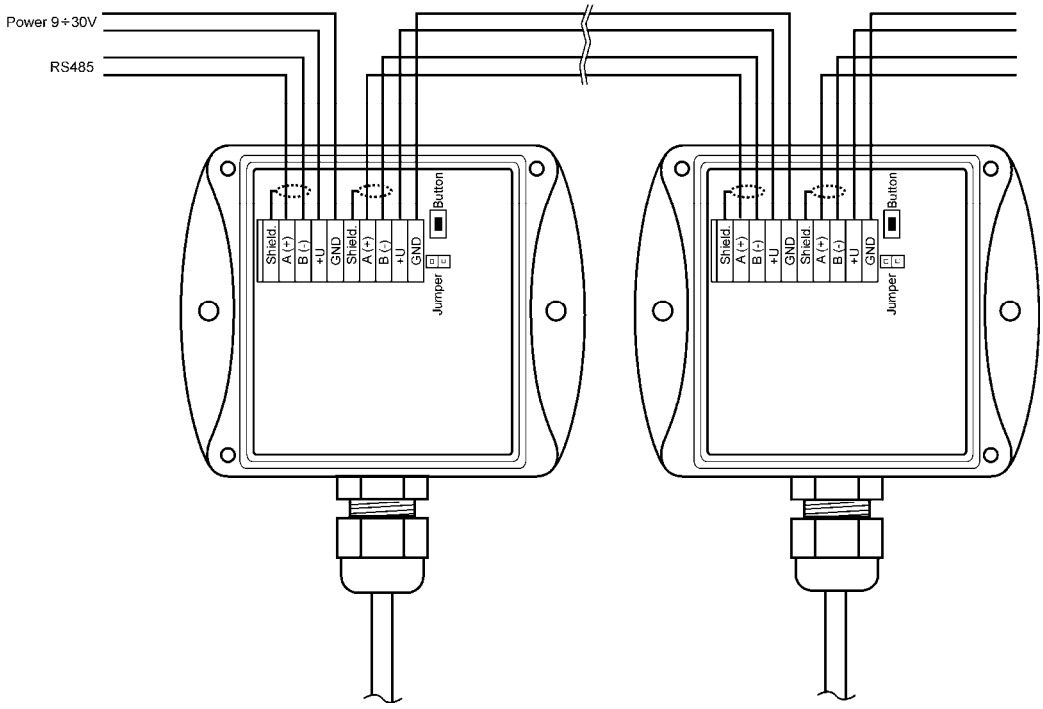
- device, which is equipped with communication link RS485 (link is galvanically isolated at RP module side)
- device must support communication protocols ModBus RTU or ADVANTECH
- 1 to 16 input device can be connected to one module
- Comet transmitters Tx4xx or other manufacturer devices are connectable this way to data logger
- it is not recommended to connect one RP module to devices working with different communication speeds or different communication protocols

How to set data logger together with input devices:

- Connect each from input devices one after another to the computer and set these parameters:
  - address of input device
  - suitable communication speed, for all device must be the **same**
  - communication protocol and other settings specific for this protocol

  Some types of input device can require connection of internal jumper Init. Follow the rules in manual for these devices.
- Connect input device to the RS485 network. Connect link to input terminals of data logger module RP and switch on.
- *Example of connection to transmitter Comet:*





Run user SW for data logger and set the data logger: *Configuration – Setting of data logger*. Here at bookmark ***Ch..Marking and conversions*** set for each channel these items:

- Device address (for RS485): enter address of input device operated from that data logger channel.
- Communication speed – set speed, input device is set to before
- Maximum waiting time: time data logger will be waiting for response from input device is adjustable from 30 to 210 ms. If response does not come within this time, error is reported.
- Communication protocol – ModBus can be used (recommended) or Advantech. New transmitters are usually set to ModBus protocol.

for ModBus protocol:

- source data – specification of transmitter space data are supposed to be gotten. For Comet transmitter it is possible to use reading of storing registers or input port without distinction.
- address of read register – enter address of register with required measured value for specification of connected device. Address can be entered from 0 to 65535. **ATTENTION** – this address corresponds to physical address of register. There are different ways of specification of this address. That is why disagreement can appear, if transmitter is adjusted by program from the manufacturer with address, which is physically present in communication. Read carefully description of connected device. Sometimes specified address equals to physical address of register (e.g. in case of RP module). Sometimes shift of 1 is defined (entered address 1 corresponds to physical address 0), sometimes shift of 40 000 or 40 001 is defined (entered address 40 001 corresponds to physical address 0). E.g. in the last case if in documentation is specified data is at the address of 40 005, it is necessary to enter address of register 4.
  Comet transmitters use these physical addresses of registers:

Value	physical register address
Temperature	48
Relative humidity	49
Calculated humidity value	50
Barometric pressure	51

- format of data - must correspond to specification of the device, if addresses from above table for Comet transmitter are used, use Signed format of data. Then set in Conversions: measured value 0 corresponds to displayed value 0, measured value 10 corresponds to displayed value 1.

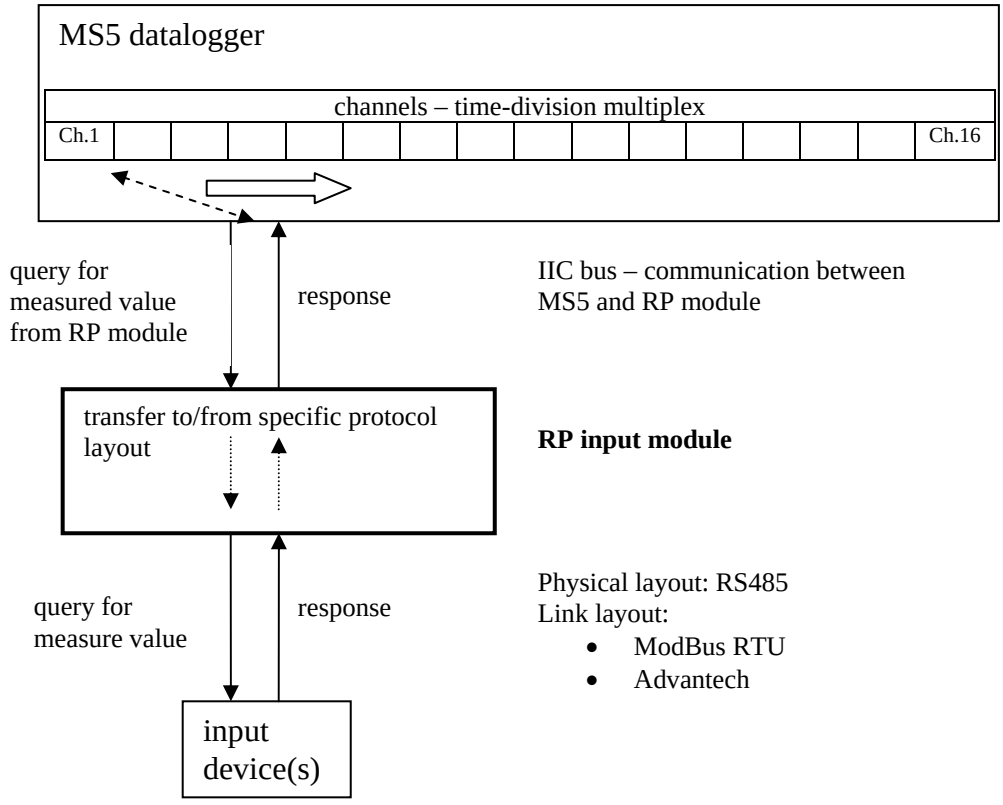
Note: Comet transmitters also enable to read with better resolution in format float uC, address of registers are then 8,10,12 and 14 for corresponding value. Support of float uC format with these transmitters is not specified and guaranteed in documentation for Advantech protocol:

- Multi-input device: If this input device measures more values, then tick this field. More information – see below protocol description.
- Number of input channel: valid for multi-input device. It is a number from 0 to 7
- Check sum – must correspond to setting of the transmitter

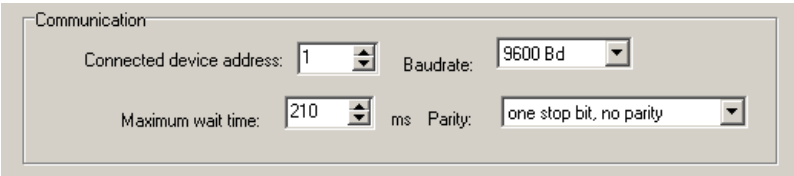
After this setting RP module works with those inputs identically as with usual analog channels

Detailed specification of communication protocol

Principle of communication:

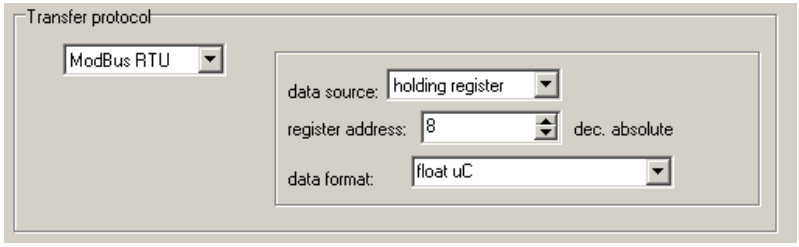


A) Communication possibilities (common setting)



Connected device address, Baudrate and Parity options are noted in table above. Maximum wait time (= Time out) ... is adjustable up to 210 ms approximately. After expiration of this duration communication error is reported and module continues with reading of the following channel.

B) ModBus RTU transfer protocol



RTU ModBus message frame:

Connected device address	Function code	Data	CRC
1 byte	1 byte	n bytes	2 bytes

Supported data request formats:

Connected device address	Function code	Starting address	No. of registers	CRC
1 byte	0x03 or 0x04	2 bytes (0...65535)	2 bytes	2 bytes

Data source:

RP module supports two function codes:
0x03 ... Read holding registers
0x04 ... Read input registers
other functions are not supported

Register address (= starting address):

absolute address of the first 16-bit reading register (address on the link layout), range: 0...65535

Data format – RP input module is suitables for reading of continuous quantities. Every read value is converted to 4 byte float (single) format for MS5. Data format item specifies No. of requested registers and their conversion method to MS5 float format.
Possible options:

- signed (-32768..32767) ... 2 byte, “integer” format, No. of registers = 1
- unsigned (0...65535) ... 2 byte, “word” format, No. of registers = 1
- signed (-32768..32767) ... 2 byte, “integer” format, No. of registers = 1
- float IEEE754 ...4 bytes, float format (register 0,register 1), No. of registers = 2
- float IEEE754 ...4 bytes, float format, (register 1,register 0), No. of registers = 2
- float for uControllers ...4 bytes, float format (register 0,register 1), No. of registers = 2
- float for uControllers ..4 bytes, float format, (register 1,register 0), No. of registers = 2

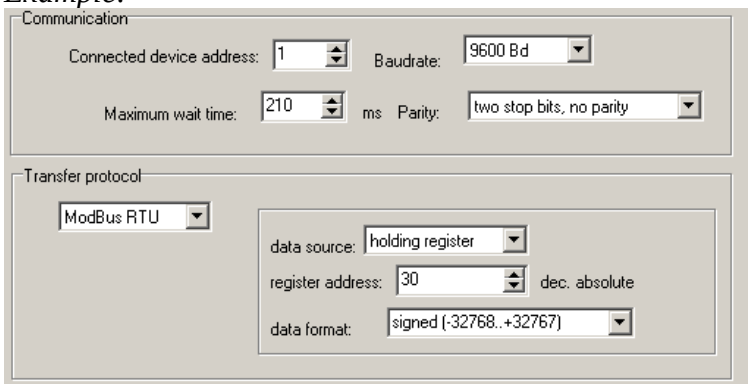
Data response format:

Connected device address	Function code	**Byte** count	Data	CRC

1 byte	1 byte	1 byte	ByteCount bytes	2 bytes

Function code in response is the same as in the request. If the exception occurs function code is 0x83 or 0x84 and data field contains error code.

Example:



Data request:

0x01, 0x03, 0x00, 0x30, 0x00, 0x01, 0x84,0x05

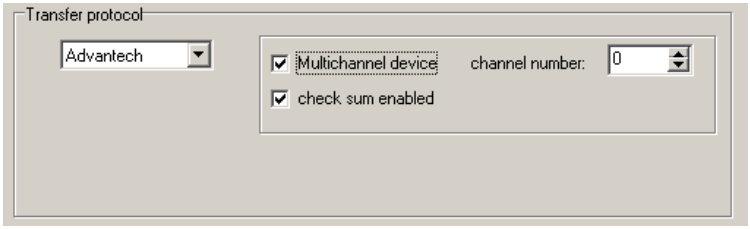
Data answer:

0x01, 0x03, 0x02, 0x01, 0x01, 0x78,0x14
data field: 0x0101 (257)

Data format of float expressions:

- float IEEE754 *No. 1 is expressed as 0x3F800000*
- float IEEE754 inverse *No. 1 is expressed as 0x0000803F*
- float for uControllers *No. 1 is expressed as 0x80000000*
- float for uControllers inverse *No. 1 is expressed as 0x00000080*

C) Advantech ASCII transfer protocol



Data request format:

start of reading	Connected device address	channel number*	CRC*	end
#	2 ascii bytes	1 ascii byte	2 ascii bytes	0x0D

Data answer format:

start	measured value	CRC*	end

reading			
>	*n* ascii bytes	2 ascii bytes	0x0D

*...optionally

Multichannel device: for the input devices that measures several values. In this case the query contains „Channel number“ field (0...7).

Check sum enabled: when is used the query contains two ascii byte CRC and answer have to contain the right CRC. Check sum is the sum of all transmitted bytes before the check sum, transmission is converted to ASCII code.

Module RP supports response format corresponding with "Engineering units" protocol ADVANTECH:

>sxxxx.xxxx(CRC)(cr)

where

s ... sign („+“ or „-“ or nothing)
x ... digits, maximum number of digits left from decimal point is 11, right from decimal point is 6
(cr) ... 0x0D

Examples:

a) one channel transmitter without CRC

the query message: #032(cr)
(hexadecimal expression: 0x23,0x30,0x33,0x32,0x0D)
the response: >+23.50 (cr)
(hexadecimal expression: 0x3C, 0x2B,0x32,0x33,0x2E,0x35,0x30,0x0D)

b) multi-channel device with CRC:

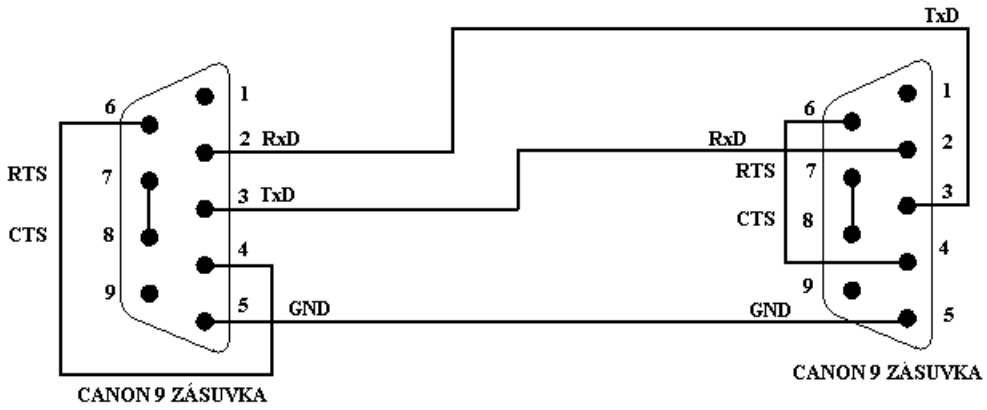
the query message: #032B8 (cr)
(hexadecimal expression: 0x23,0x30,0x33,0x32,0x42,0x38,0x0D)
the response: >358B(cr)
(hexadecimal expression: 0x23,0x33,0x35,0x38,0x42,0x0D)

Error messages:

Error code	ModBus RTU protocol	Advantech protocol
1		>-0000 response
2		>+9999 response
3	TimeOut – no response	
4	invalid CRC	
5		invalid character in response
6		too little of characters in response
7	unknown function code	
8	ModBus exception occurs	
9		too long response
0x95	unknown transfer protocol	

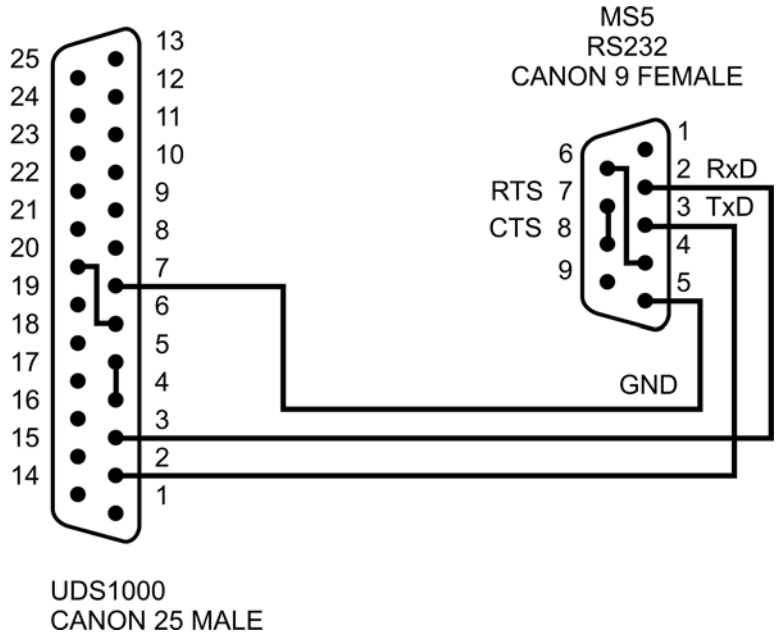
APPENDIX 4: Communication cables

1.. Wiring diagram of communication cable RS232

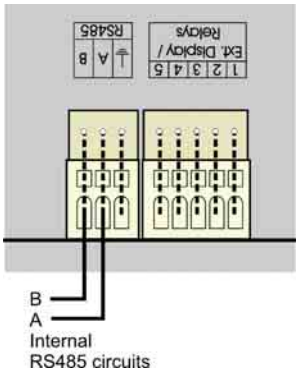


This communication cable serves for direct connection of data logger to the computer.

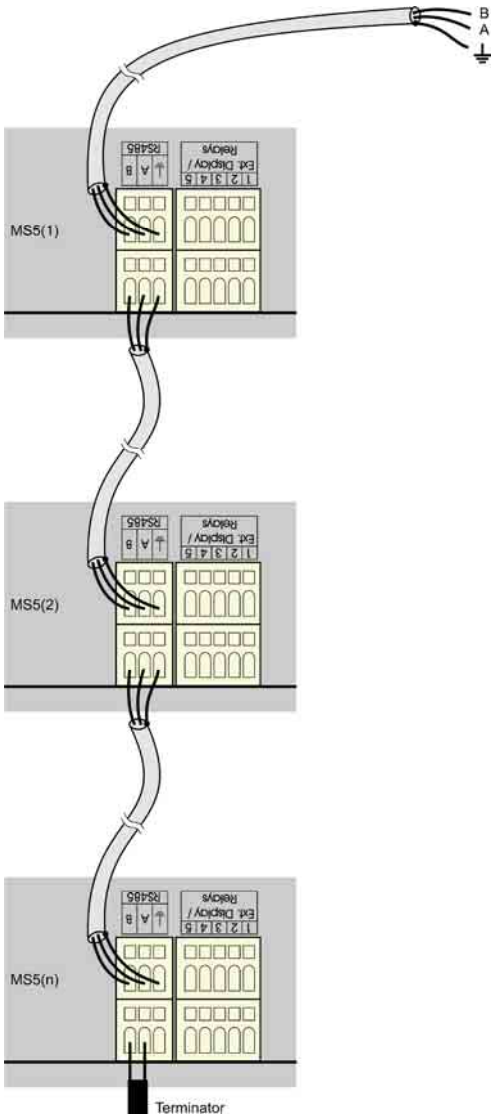
3. *Wiring diagram of communication cable between data logger and RS232/Ethernet converter UDS10/100/1000*



4. *Wiring of RS485 terminals at data logger*
5.



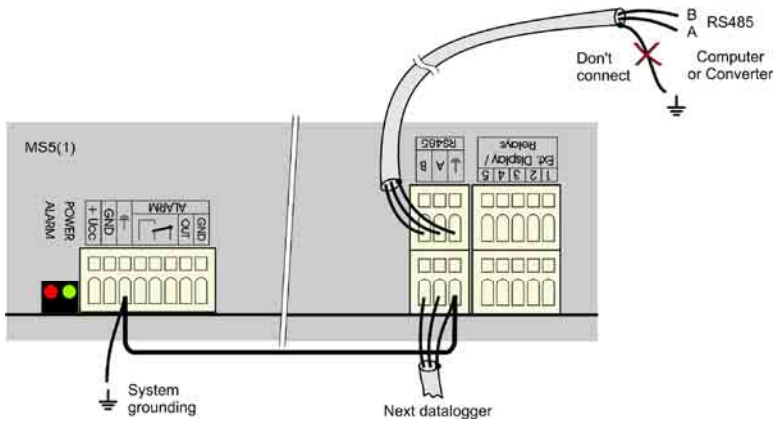
D4.4 The way of data loggers connection by means of RS485 interfaces



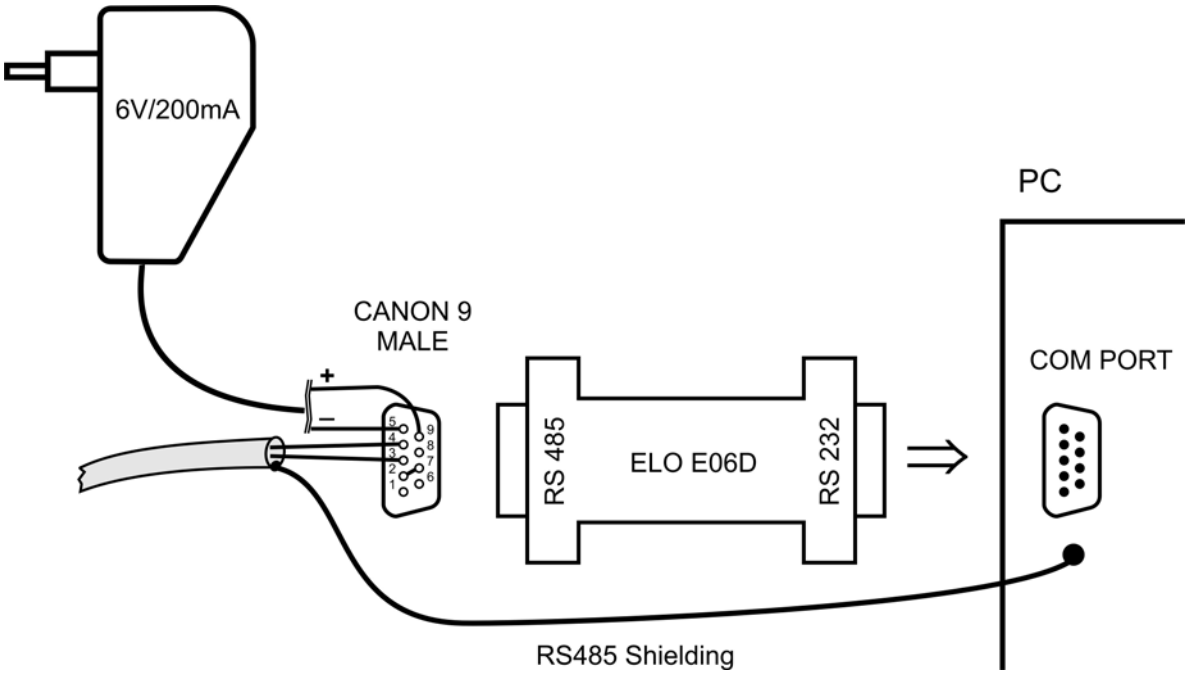
Recommended parameters of connection leads:

Twisted two-wire, shielded, nominal impedance 100 Ω, loop resistance max. 240 Ω, max. 98 Ω/km, maximum capacity 65 pF/m, crosstalk between pairs –40 dB/150 kHz. For longer distances use cabling in one line, i.e. no „tree“ or „star“ (for shorter distances different topology can be tolerated). At the beginning and end termination resistor should be (120 Ω). In many cases termination resistor can be omitted due low communication speed. Marking of link leads from other manufacturers: „+“ corresponds with marking „A“, „-“ corresponds with marking „B“. Connect cable shielding to each other, do not connect to transmitter, if those are not equipped with shielding terminal galvanically isolated from communication and measuring circuits, including case metal parts.

In case shielding of RS485 link is not possible to ground at computer side, ground at data logger <u>nearest to the computer</u>:

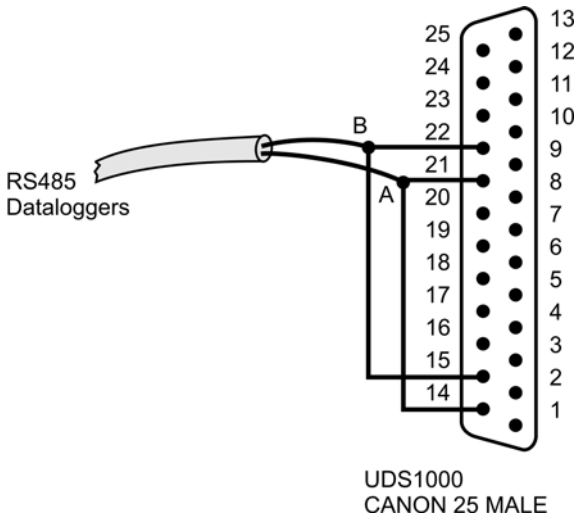


Wiring diagram of connection to RS232/RS485 converter:

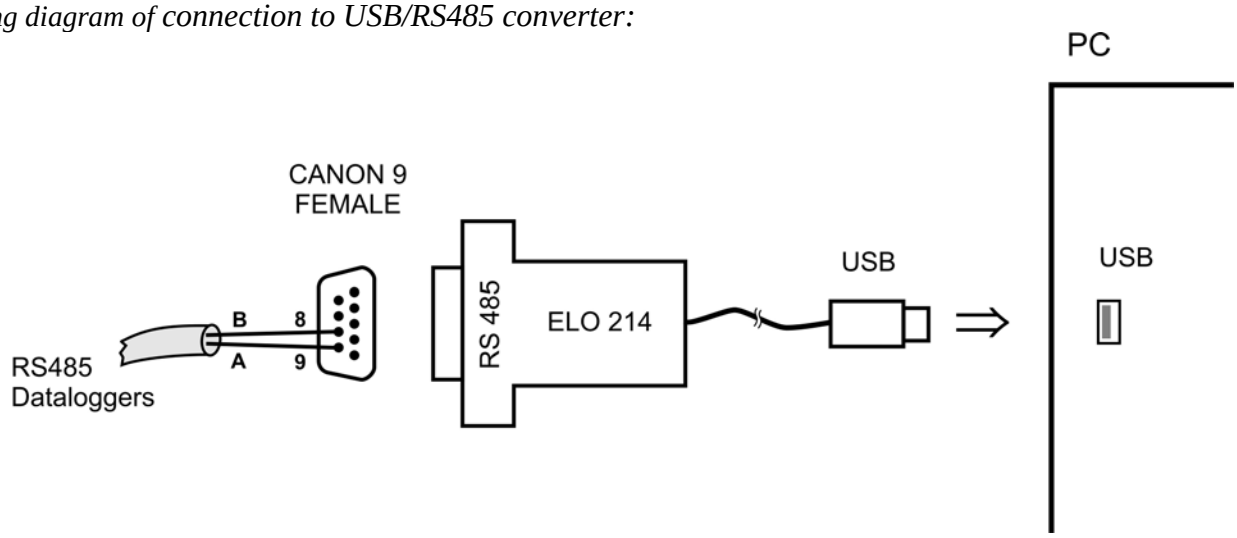


For connection of RS485 link to the computer it is recommended to use external RS485/RS232 converter with automatic switching of transfer direction, type E06D powered from adapter 6V DC. This converter is possible to plug to serial communication computer port COM. Connect link from data logger to the RS485 side with correct polarity (pins 3 and 4) and **connect pins 2 and 7 to each other** . It corresponds with setting of time constant of automatic converter switching for speed 115200 Bd. At this setting mostly there are no problems in communication at lower speed). During communication it is necessary to connect DC output of ac/dc adapter 230V/6V DC to the converter and adapter plugged in mains.

Wiring diagram of cable between data logger and RS485/Ethernet converter UDS10/100/1000



Wiring diagram of connection to USB/RS485 converter:



Note: if cable shielding is not connected to ground of some data logger (see figure above), then connect shielding to pin 5 of SubD connector.

APPENDIX 5: Configuration of data logger with external modem

When there is a need to connect datalogger via telephone network (land line or GSM) the configuring of GSM modem on datalogger side is necessary. Connect modem to computer by a cable, which is the accessory of the modem, plug in the ac/dc adapter and switch ON the modem. Newer SW versions can set it directly in SW Service menu (its activation is described in Service manual). Bellow is mentioned “manual” setting by Hyperterminal.

Instructions for "manual" communication setting by means of modems:

Configuration of data logger´s communication interface

Connect data logger via RS232 link to the computer (included cable), switch on and run user PC program. Choose selection *RS232- modem* from *Configuration menu.*

Configuration of external modem at data logger side

Run *HyperTerminal* program on your computer (it is located in *Accessory - Communication).* After its running a request of creation of new connection appears. Cancel this request. In menu *File - Parameters* choose in item *Connect by means of* selection *Directly to port COM1* (respectively COM2, if modem is connected to communication port COM2). Choose selection *Configuration* at the same window and set parameters *Number of bits per second* to 115200, *Number of data bits* to 8, *Parity*: no, *Stop-bits*: 1, *Flow control*: hardware. Confirm both windows to return to terminal. Here enter command **AT (cr)** (i.e. enter in upper case letters AT and press the Enter key). Modem must response: **OK.**

Setting of modem for land line

Now it is necessary to configure modem itself in the way modem after reception must "hung-up" (disconnect the call) and cancel the control of the DTR-DSR loop. This can be done as follows:

a) **AT&Y0** cr (selection of user template 0)

b) **ATS0=1** cr (modem „hang-up after the call”)

c) **ATS23=060** cr (communication speed 19200 Bd)

d) **AT&D1** cr (cancel of testing DTR-DSR loop)

e) **AT&W0** cr (saving of active configuration to profile 0)

Now modem is configured and can be switched OFF. Modem responds **OK** to each commands.
Notice: *Be careful not to send to modem AT command in other communication speed. It could cause modem reconfiguration.*
Note: *The above description was verified with modems Microcom DeskPorte 56k Voice, ASKEY V 1456 VQE R-1 and ORIGO FM-56DT.*

2.2. Setting of GSM modem - SIM card used in GSM modem must be set not to require PIN after switching ON the modem power. Modem should be set to automatically pick up the call and to enter data mode immediately.

Example for GSM modem WAVECOM Supreme:

a) **AT&F** cr (factory default)
b) **AT+IPR=9600** cr (serial interface of modem sets to 9600 Bd)
c) now is neccessary to change Hyperterminal baudrate to 9600Bd
d) **AT+CICB=0** cr (automatic jump to data mode)
e) **ATS0=1** cr (automatic call pick-up after first ring)
f) **AT&D0** cr (DTR is ignored)

g) **AT&S0** cr (DSR always ON)
h) **ATE0** cr (ECHO off)
i) **AT&W** cr (configuration writing to EEPROM memory).

What to do if connection does not work

If communication via modems does not work and data logger itself communicates with the computer, check first if wiring and each setting are correct. Pay attention to connection cables, which must be original to modems. Cable included in data logger is designed only for direct connection between computer and data logger. If everything is correct it is useful to test communication between two computers. Modem, which was at data logger side connect to the first computer and run *Hyperterminal*. Connect modem, which was at the computer to the second computer (it is supposed, it is already installed) and also run *Hyperterminal*. Here in contrary with the first computer create new connection with telephone number of link, first modem is connected to. Now there is no other way out than take modem user manual and try to create both-direction data connection at suitable communication speed.

APPENDIX 6: Influence of cable resistance to measurement accuracy with RTD sensors

In case inputs J (Ni1000), K (Pt100) or K1 (Pt1000) are installed and RTD probe is connected, then non zero cable resistance causes additional measurement error, which is added to real temperature. This error depends on cable cross-section, its length and sensor type. If it is known correction is enabled by recalculation of input channels.

Added error for copper wire (two wires) at temperature 23°C:

Cable cross-section [mm2]	0,22	0,34	0,50	1,00	1,50	2,00	2,50
Cable length [m]	Added error for Ni1000/6180ppm [°C]						
1	0,02	0,01	0,01	0,00	0,00	0,00	0,00
2	0,04	0,03	0,02	0,01	0,00	0,00	0,00
5	0,12	0,07	0,05	0,02	0,01	0,01	0,01
10	0,24	0,15	0,10	0,05	0,03	0,02	0,02
15	0,36	0,23	0,16	0,08	0,05	0,04	0,03
Cable length [m]	Added error for Pt100/3850ppm [°C]						
1	0,36	0,24	0,16	0,08	0,05	0,04	0,03
2	0,73	0,47	0,32	0,16	0,11	0,08	0,06
5	1,82	1,18	0,80	0,40	0,27	0,20	0,16
10	3,64	2,36	1,60	0,80	0,53	0,40	0,32
15	5,47	3,54	2,40	1,20	0,80	0,60	0,48
Cable length [m]	Added error for Pt1000/3850ppm [°C]						
1	0,04	0,02	0,02	0,01	0,01	0,00	0,00
2	0,07	0,05	0,03	0,02	0,01	0,01	0,01
5	0,18	0,12	0,08	0,04	0,03	0,02	0,02
10	0,36	0,24	0,16	0,08	0,05	0,04	0,03
15	0,55	0,35	0,24	0,12	0,08	0,06	0,05

Added error for copper wire (two wires) at temperature 100°C:

Cable cross-section [mm2]	0,22	0,34	0,50	1,00	1,50	2,00	2,50
Cable length [m]	Added error for Ni1000/6180ppm [°C]						
1	0,02	0,01	0,01	0,00	0,00	0,00	0,00
2	0,04	0,02	0,02	0,01	0,00	0,00	0,00
5	0,10	0,06	0,04	0,02	0,01	0,01	0,01
10	0,20	0,13	0,09	0,04	0,03	0,02	0,02
15	0,30	0,20	0,13	0,06	0,04	0,03	0,02
Cable length [m]	Added error for Pt100/3850ppm [°C]						
1	0,37	0,24	0,16	0,08	0,05	0,04	0,03
2	0,75	0,48	0,33	0,16	0,11	0,08	0,07
5	1,86	1,21	0,82	0,41	0,27	0,21	0,16
10	3,73	2,41	1,64	0,82	0,55	0,41	0,33
15	5,60	3,62	2,46	1,23	0,82	0,62	0,49
Cable length [m]	Added error for Pt1000/3850ppm [°C]						
1	0,04	0,02	0,02	0,01	0,01	0,00	0,00
2	0,07	0,05	0,03	0,02	0,01	0,01	0,01
5	0,19	0,12	0,08	0,04	0,03	0,02	0,02
10	0,37	0,24	0,16	0,08	0,05	0,04	0,03
15	0,56	0,36	0,25	0,12	0,08	0,06	0,05

APPENDIX 7: Selected error messages of data logger

Error number	MEANING
1	A/D converter is at lower limitation (input quantity – is below lower limit of module range)
2	A/D converter is at upper limitation (input quantity – is over upper limit of module range)
3	RS , RP input module did not receive response from connected device in adjusted time
10	counter module does not contain valid data
130	input module was not found
137	counter value is not possible to display (it contains more than 10 digits) – only display error
160-177	corruption of configuration areas of data logger
178	installed different type of module
179	upgrade of input module was not performed
187-188	unauthorized access (non valid password)
189	error of measurement of thermocouple cold junction

APPENDIX 8: Support of reception and sending of SMS messages

Data logger enables to respond to SMS query and sending SMS alarm messages.

Hardware requirements:

- data logger with FW version 2.0 and higher
- GSM modem connected to data logger, modem must support PDU SMS format and its SIM card must have stored SCA number (Service Center Address)

There are the following connection modes:

a) modem is connected to main RS232 interface – used in case, modem is used both for data and SMS communication (data logger is at distant place without PC). Advantage is a simple connection, disadvantage can be potentially possible short dropouts in communication with master PC in time, when data logger contacts the modem. Lower transmission speed can be another disadvantage. Data logger tests requests for reception/sending of SMS messages each two minutes. If data communication runs (download of record values, change of configuration, the Display mode), then SMS processing is backed away to 2 minutes after last data communication with data logger. In this mode data transfer has higher priority than SMS message. It is not recommended to monitor the data logger in the Display mode permanently.

b) modem is connected to main RS232 interface of data logger and the PC is connected to RS485 interface of data logger. Data logger is set to RS232 (not to RS232-modem). In this case data logger connects the modem, if there was at least two minutes delay in communication with the PC. During communication with modem data logger does not response to queries from the PC till the end of transaction with GSM modem (at the moment RS485 is set to sending and reception from the PC is blocked and thus the possibility of data collision).

Data logger function is verified with GSM modem Wavecom WMOD2.

Format of received SMS messages:

PDU format, support of 7 bit, 8 bit a 16 bit coding without compression, telephone number in international/national format, ISDN/telephone numbering plan, maximum 15 characters of telephone number, maximum length of text message 64 characters, message can contain UHD of 36 character maximum length, TP-PID= 00h (Short Message Type 0). If those parameters are matched, message is accepted and decoded by data logger, i.e. UDH block is removed, text is converted to capital letters and compared with predefined strings: **Info, Alarm, Ch1 to Ch16**. In case valid string was received (no matter if capital/lower-case letters), data logger sends proper response and received message is cleared from modem. If received SMS message is not valid it is cleared from modem without sending any response.

Format of sent SMS messages:

PDU format, 7 bit coding without compression, telephone number in international format maximum length 15 characters, Validity period: 3 days, with all messages except response to request **Info** one SMS is sent of maximum 160 characters. In response to request **Info** sequence of one to four SMS messages is sent (depending on configuration of data logger), maximum length is 152 characters for a message. Messages contain UDH with code for linking to one long SMS on mobile telephones, which support linking of SMS together. For proper function **it is necessary** to have telephone number SCA (Service Center Address) stored on SIM card of the modem.

With messages sent due to creation of alarm or critical state, after SMS is sent all alarm states in data logger are stored. If no change in alarms appears, another message is not sent. If alarm stops to be active and appears again, message is sent. If alarm at another channel appears, message is sent again (If it is allowed by the user). If critical error state for sending SMS appeared

(defined delay expired) and before sending of this SMS appeared new critical states, the states are included into the SMS. It is always recommended to set suitable hysteresis and alarm delay.

Detailed description of SMS content:

1. **Information on data logger**

is sent if SMS with text **Info** was received. Then SMS contains:

- type of data logger (e.g. MS3+)
- name of data logger (see setting of data logger)
- state of memory occupation
- for each channel:
  - channel name
  - measured value
  - physical unit
  - state of alarms

Total number of sent SMS messages is 1 to 4 depending on configuration of data logger. Messages contain information intended for linking together at the recipient to one long SMS.

2. **State of alarms**

is sent if SMS with text **Alarm** was received
or
if at some channel appeared new alarm and is required its report by SMS. Message contains:

- type of data logger (e.g. MS3+)
- name of data logger (see setting of data logger)
- list of channels, where Alarm 1 appeared
- list of channels, where Alarm 2 appeared

3. **Information on particular channel**

is sent if SMS with text **Chn** (where n is channel number 1 to 16). Message contains:

- type of data logger (e.g. MS3+)
- name of data logger (see setting of data logger)
- state of memory occupation
- information on specified channel:
  - channel name
  - measured value
  - physical unit
  - state of alarms

4. **Message on creation of critical state**

is sent if critical error state in data logger appeared and SMS report is required.
Message contains:

- text WARNING!
- type of data logger (e.g. MS3+)
- name of data logger (see setting of data logger)

actual list of critical states in data logger (selftest error, configuration, measurement, overrun of adjusted limit, fulfilling of memory)

APPENDIX 9: Setting of communication with data logger via Ethernet

Setting depends on type of communication device. Below are described general steps and examples illustrate data logger equipped with own Ethernet interface or with converter *UDS-1000* from *Lantronix.*

Procedure:

1. Probably knowing of MAC address of converter or data logger is necessary (if it is equipped with Ethernet interface). MAC address is mostly specified on the manufacturer label.

   Example of MAC address: 00-20-4A-80-F2-FB

2. Ask administrator of your network to assign free IP address

   Example of IP address: 194.168.1.211

3. Connect data logger to Ethernet network (directly or via converter) and switch on its power
4. Run user SW for data logger and in window Configuration - Setting communication display parameters of the Ethernet communication device (button New or Change) and use selection Search (next to IP address). If device is not found (detect e.g. by means of disconnecting from Ethernet network and see, if there is any change in the search), then follow the below instruction.
5. If connection is not successful, try to disconnect the computer from the network and use crossed Ethernet cable to connect data logger to the computer directly and repeat the setting.

If IP address is set correctly, communication device is found, but data logger does not work, check setting of Communication interface. Best way is to check on display of data logger: must be set to Ethernet.

Solving problems with communication:

A) data logger is connected to the network by external converter (UDS100, UDS1000, UDS1100...):

Problem can be in setting of communication interface and communication speed of Ethernet output itself. In this case proceed this way:

Run internet browser and enter directly data logger IP address (it is necessary to have installed Java script), wait for reading of www pages of this device.
Enter at bookmark Port Properties or Channel 1:

- *Serial protocol:*
  RS232, if data logger contains Ethernet interface or you communicate with data logger connected to converter UDS-10 connected to RS232 interface of data logger
  RS485-2 wire, if converter is connected to RS485 interface of one or several data loggers
- *Speed – communication speed, must be the same, as set on data logger itself (can be found from data logger menu of MS5D LCD)*
- *Character Size: 8, Parity: None, Stopbit: 1, Flow Control: None, UDP Datagram Mode: Disable, Remote IP Address: same as used before, Local Port: 10001, Disconnect Mode: Ignore DTR, Other items: Disabled*

Save the configuration to the device finally and try to find data logger again.

B) Data logger is equipped with internal Ethernet interface

- **In the window of device finding only IP and MAC address are displayed**

  Other details are marked as N/A. This problem appears in case, IP address of data logger is set to different network, than network data logger is actually connected to.

  Select in program menu Configuration - Setting communication – Change – Find - `Change` IP address. Follow instructions from the PC program.

- **IP address is not displayed even in the window for device finding**

  Select in program menu Configuration - Setting communication – Change – Find - *Help! My device wasn't found!*. Follow instructions from the PC program.

- **Device is not found even after manual entering of MAC address**

  This problem appears especially in cases, IP device belongs to different network and at the same time incorrect gate address and mask is specified.

  Select in program menu Configuration - Setting communication – Change – Find - *Help! My device wasn't found!*. In window `Set IP to ARP only`, enter data logger MAC address isolated by hyphens to the cell `Device MAC` address (e.g. 00-20-4A-84-F0-80) and press button "Set IP".

  Run command line of system Windows (`Start/run`) and enter `telnet new IP_address 9999`. You get to the text mode of setting data logger interface (e.g.: `telnet 192.168.1.211 9999`).

  Press enter key and 0 - Global Settings, set IP address of the device, cancel IP address of gate, set number of mask bits to 0. Confirm the rest by enter key to get to menu. Here save setting by selection 9 Save and Exit. Then connection is closed. Now it is possible to connect to data logger by the program.

- **Communication with program works, but it is not possible to change setting of data logger Ethernet interface**

  If data logger is set to communicate with the program (it is possible to read the Display mode, download data etc.), but configuration of Ethernet interface cannot be changed (e.g. IP address of traps, IP address of data logger…), probably you have adjusted high level of security. Proceed in accordance with the Service manual.

APPENDIX 10: Creation of www pages for MS5

Data logger enables user to store own web pages to display actual measured values and alarm states. Files web2cob.exe, mimetype.ini, ron.gif, al2.gif, alarm.gif, led.gif will be necessary for successful creation of own www pages. Download files from manufacturer pages. Also tftp client is necessary (default in Windows XP).

Pages are created in html code, web server of data logger detects the GET command. Data logger has available six banks WEB1-6 after 64kB for www pages.

Address of www pages is http://IP_address_data logger/page.html. If your main page is named index.html, only enter data logger IP address in internet browser to address of pages.

Procedure of www pages creation

Create HTML pages in any editor. Enter proper mark to the point where values from data logger are meant to be located:

<%srn%>	serial number of data logger
<%name%>	name of data logger
<%rfr%>	refresh of pages
<%type%>	data logger model
<%fw%>	version of firmware of data logger Ethernet interface (it is different from FW version of data logger itself)

Valid for all 16 channels; enter 1 for required channel:

<%c1n%>	name of channel 1
<%c1v%>	measured value
<%c1u%>	physical unit of the value
<%c1a%>	state of alarm 1
<%c1b%>	state of alarm 2
<%c1p%>	name of actual process
<%c1r%>	information, if record runs

<%iacs%>	state of internal audio indication
<%oacs%>	state of ALARM OUT output
<%iap%>	icon of state of internal audio indication
<%oap%>	icon of state of output ALARM OUT
<%tico%>	icon of selftest state
<%slft%>	values measured by selftest
<%ram%>	state of memory occupation and logging mode

Example:

Example of the code :

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
  <head>
  <meta http-equiv="refresh" content="<%rfr%>">
  <meta http-equiv="content-type" content="text/html; charset=windows-1250">
  <title>values</title>
  <style type="text/css">
  <!--
    body{   font-family: verdana, arial, helvetica, sans-serif;  font-size:
76%;
```

```
         color: #000;   background-color: #fff; }
    h1{     font-size: 2.0em; font-weight: normal;margin-top: 0em;     margin-
bottom: 0em;}
            .a1 {background-color: red;}
            .a2 {background-color: yellow;}
            .a0 {background-color: #d3d3d3;}
  //-->
  </style>
</head>
  <body>

      <script>
            p1 = new Image();
            p1.src = "ok.gif";
            p2 = new Image();
            p2.src = "al1.gif";
            p3 = new Image();
            p3.src = "al2.gif";
            p4 = new Image();
            p4.src = "ron.gif";
      </script>

  <h1>Monitoring:</h1>
  <table border="1" cellpadding="2" cellspacing="0">
    <tr bgcolor="#bbbbbb">
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                  <td width="180px" align="center"><b>Channel name</b></td>
                  <td><b>R</b></td>
                  <td width="180px" align="center"><b>Value</b></td>
                  <td width="80px" align="center"><b>Unit</b></td>
                  <td width="20px" align="center"><b>I.</b></td>
                  <td width="20px" align="center"><b>II.</b></td>
                  <td width="180px" align="center"><b>Process</b></td>
            </tr>
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                  <td><%c1r%></td>
                  <td align="right"><%c1v%> </td>
                  <td> <%c1u%></td>
                  <td><center><%c1a%></center></td>
                  <td><center><%c1b%></center></td>
                  <td> <%c1p%></td>
            </tr>
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                  <td align="right"><%c2v%> </td>
                  <td> <%c2u%></td>
                  <td><center><%c2a%></center></td>
                  <td><center><%c2b%></center></td>
                  <td> <%c2p%></td>
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                  <td><%c3r%></td>
                  <td align="right"><%c3v%> </td>
                  <td> <%c3u%></td>
                  <td><center><%c3a%></center></td>
                  <td><center><%c3b%></center></td>
```

```
            <td> <%c3p%></td>
        </tr>
<tr>
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            <td align="left"> <%c4n%></td>
            <td><%c4r%></td>
            <td align="right"><%c4v%> </td>
            <td> <%c4u%></td>
            <td><center><%c4a%></center></td>
            <td><center><%c4b%></center></td>
            <td> <%c4p%></td>
        </tr>
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            <td align="right"><%c5v%> </td>
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            <td><center><%c5a%></center></td>
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            <td> <%c5p%></td>
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            <td> <%c7p%></td>
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            <td> <%c8p%></td>
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            <td><center><%c9a%></center></td>
            <td><center><%c9b%></center></td>
            <td> <%c9p%></td>
        </tr>
```

```
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                  <td> <%c12p%></td>
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                  <td align="right"><%c13v%> </td>
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                  <td><center><%c13a%></center></td>
                  <td><center><%c13b%></center></td>
                  <td> <%c13p%></td>
            </tr>
    <tr>
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                  <td> <%c14u%></td>
                  <td><center><%c14a%></center></td>
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                  <td> <%c14p%></td>
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    <tr>
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                  <td align="right"><%c15v%> </td>
                  <td> <%c15u%></td>
                  <td><center><%c15a%></center></td>
                  <td><center><%c15b%></center></td>
                  <td> <%c15p%></td>
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    <tr>
              <td>16</td>
```

```
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                    <td align="right"><%c16v%> </td>
                    <td> <%c16u%></td>
                    <td><center><%c16a%></center></td>
                    <td><center><%c16b%></center></td>
                    <td> <%c16p%></td>
                </tr>
  </table>

  </body>
</html>
```

Pages are displayed in browser this way:

Monitoring:

Nr.	Channel name	R	Value	Unit	I.	II.	Process
1	Chann.1: DC I	☑	0.02	mA	◉	◎	
2							
3							
4	Chann.4: DC I	☑	0.02	mA	◉	◎	
5							
6							
7							
8	Chann.8:Counter	☑	0		◎	◎	
9							
10	Chann.10:Counter	☑	76		◎	●	
11							
12							
13							
14							
15							
16							

Compilation and upload of pages

Store pages for upload to data logger to one directory. The above required pictures store to the same directory with you r pages. Run program web2cob.exe to create .cob file. Upload this file by means of tftp protocol to data logger.

Parameters of program web2cob.exe:
`Web2CoB [/o <output file>] [/d <directory>]`
Output file: Name of output file. Preset name is cobox.cob.
Directory: Source directory with www pages.
Parameters of tftp transfer: select binary transfer, method PUT. Select target address from WEB1 to WEB6.
Note: File `mimetype.ini` must be located in the same directory as `Web2Cob.exe`

Example:

Data logger has IP address 192.168.1.205. In directory `c:\MS\www` are located www pages. In directory `c:\MS are` files `Web2Cob.exe` and `mimetype.ini.` Go to the directory `c:\MS` and enter command:

```
web2cob.exe /d www /o TESTWEB.cob
```

In directory `c:\MS` file `TESTWEB.cob` is created.

Upload www pages to data logger by command `tftp -i 192.168.1.205 PUT TESTWEB.COB WEB1`, memory area WEB1

Limitation:

Maximum size of one WEB (cob) page is 64kB. In case size of www page exceeds 64kB, divide it to max. 6 blocks, compile one after another and store to areas WEB1-WEB6

Each tag of type <% %> must be located on separate line in source file.

Capacity of www server of data logger is limited. The bigger the pages are, the lower number of possible simultaneous accesses will be.

APPENDIX 11: SOAP protocol of Ethernet interface for MS5

SOAP serves for sending measured data to a HTTP server. With the aid of this protocol data are sent as a XML document (SOAP message). The advantage of this protocol is that sent data aren't binary and for this reason SOAP messages are allowed through firewalls.

1. Example of SOAP message sent from MS5

```
<?xml version="1.0" encoding="utf-8"?>
  <soap:Envelope xmlns:soap=http://schemas.xmlsoap.org/soap/envelope/
                 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                 xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <soap:Body>
      <InsertSample xmlns="http://cometsystem.cz/schemas/soapMS5.xsd">
        <passKey>07050029</passKey>
        <name>Nějaký text</name>
        <SampleDate>Local: 0.098</SampleDate>
        <CH1>
          <V>0.02</V>
          <I>1</I>
          <II>0</II>
        </CH1>
        <CH2>
          <V>0.02</V>
          <I>1</I>
          <II>0</II>
        </CH2>
        <CH3>
          <V>Kontakt rozepnut</V>
          <I>0</I>
          <II>1</II>
        </CH3>
        ...
        <CH16>
          <V></V>
          <I>0</I>
          <II>0</II>
        </CH16>
        <SELFTEST>Pass (25 V -4.9 V 3.1 V)</SELFTEST>
        <INT_ACOUSTICS>Inactive</INT_ACOUSTICS>
        <ALARM_OUT>Inactive</ALARM_OUT>
        <MEM_USG>18%, cyclic record</MEM_USG>
      </InsertSample>
    </soap:Body>
  </soap:Envelope>
```

element <soap:Envelope>: Specifies that the XML document is a SOAP message. It is defined by the SOAP protocol.

element <soap:Body>: Everything what is nested in this element are SOAP message data. It is defined by the SOAP protocol.

element <InsertSample>: It is needed to have running HTTP server for accepting SOAP messages. For example it can be Microsoft Internet Information Service or Apache HTTP server. There have to be installed a web service for processing data from the message on this server. For example ASP.NET or PHP can be used for creating the web service. This service must include a method of the same name as this element (thus InsertSample). Descendants of the element InsertSample (nested elements PassKey, SampleDate,…) must correspond to parameters of the method.

The attribute xmlns defines a namespace for elements of the SOAP message. For namespace name was chosen the URI referring to the XSD schema which describes this SOAP message. This schema only defines the structure of the XML document which represents the SOAP message. It is in no manner related to the sending and accepting functionality.

Element <passKey>: Contains the device serial number (an eight digit whole number)

Element <SampleDate>: Contains the value of time. It is either synchronized with a SNTP server (format: “dd.mm.yyyy hh:mm:ss”) or simply a number of seconds elapsed from enabling the device (format: “Local: <NumberOfSeconds/1000”).

Elements <CH1> to <CH16>

Element <SELFTEST>

Element <INT_ACOUSTIC>

Element <ALARM_OUT>

Element <MEM_USG>

2. Modification of the structure of the SOAP message

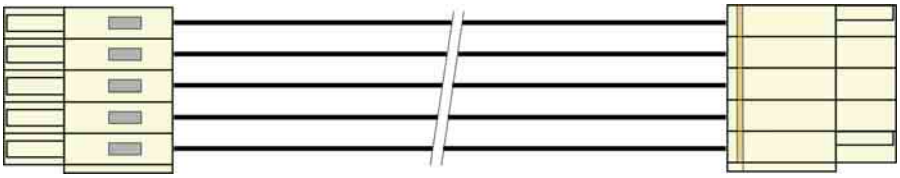
It is possible to write your own XML document which represents the SOAP message. You can create it in whatever text editor. Enter proper tag according to the table below to the place where you want to insert any of data field provided by the device. Finally save the file with the name ”soap” and add it to the directory with web pages. Its upload to the device is part of web pages upload.

MS5 tags

Tag	Description
<%srn%>	Serial number of the transducer
<%time%>	Writes a time. It is either synchronized with a SNTP server (format: “dd.mm.yyyy hh:mm:ss”) or simply a number of seconds elapsed from enabling the device (format: “Local: <NumberOfSeconds/1000”)
<%c1v%>…<%c16v%>	
<%c1a%>…<%c16a%>	
<%c1b%>…<%c16b%>	
<%slft%>	
<%iacs%>	
<%oacs%>	
<%ram%>	

3.

APPENDIX 12: Connection of data logger with output relay module and external terminal



ATTENTION – cable is crossed, if wired different way than on the figure, connected circuits can be damaged !

APPENDIX 13: Setting of client administration and passwords

This APPENDIX describes security of data logger MS+ against illegal access. This issue is applied in following levels:

- Encryption of transferred data in communication with data logger
- Protection against illegal access to program and limitation of its functionality in accordance with setting of user rights
- Protection against illegal access to setting of data logger and limitation of configuration options in accordance with setting user rights.

1. Encryption of data in communication with data logger

is a way of protection of transferred data between computer and data logger by means of client specified password. The reason is protection against interception of transferred data via cable links or intranet/internet, that could be decoded based on available documentation of communication protocol of data logger.

Encryption of communication data and password for data logger is activated in setting of data logger in bookmark "Common setting" in section "Communication interface of data logger" see appendix 1.

In options of program in bookmark „Users and passwords" in section „Password for data encryption" (see appendix 2) is possible to set way to enter password for encryption of communication:

- Password will be permanently stored in the computer
  At first opening of communication with data logger client is invited to enter password. Password is stored and used further in communication with data logger even after re-run of the program
- Password will be memorized only to the end of application
  After running the program and opening of communication with data logger client is invited to enter password, which is memorized only during program run and after exiting program is no longer valid.

1. Administration of clients

List of authorized clients for access to program or to setting of data logger and their rights is possible to set in program options in section „User list", see appendix 2.

„User list" can contain up to 16 clients with the following parameters:
„User name" – unique user name for access to account
„Password" – password for access to account
„Name and surname" – name and surname of client
„Description" – description of user account
„Group membership" – membership in group of clients

- „User with limited privileges" – access to SW and HW protected functions is enabled to define except for rights to administrate the clients.
- „Administrator" – member of this group has unlimited access to SW and HW protected functions including administration of clients.

„SW protected functions“ – are functions accessible by client in work with program in itself
„HW protected functions“ – are functions accessible by client in work with data logger

„Create new password“ – entering of new password of client
„Export“ – exports list of clients to the file
„Import“ – reads list of clients from the file
List of clients stored to the file is possible to use for transfer of clients between program installations on more computers or for theirs back-up. Always store this file to a ***safe place***.

3. Protection against illegal access to program and limitation of its functionality in accordance with setting user rights

limits access to program and its „SW protected functions“ only to clients defined in section „User list“, in accordance with their rights. It is activated in program options in bookmark „Users and passwords“ in section „Password protection“, see appendix 2.

If „Password protection“ is activated, after program run client is invited to login to his user account defined in „User list“.

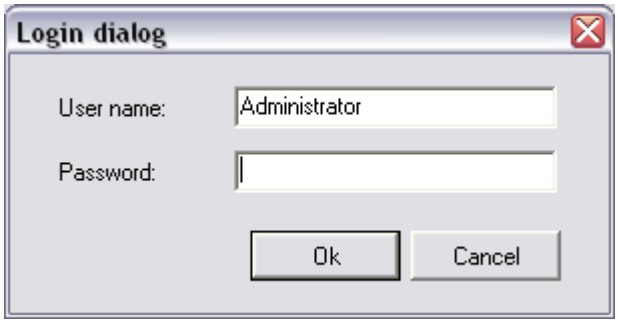


Figure 1 „Login dialog“

The way to authorize client in access to „SW and HW protected functions“ is set program options in bookmark „Users and passwords“ in section „How to execute login dialog“

- At application startup only
  User account client is logged in after program run will be used automatically to authorize access to „SW and HW protected functions“, i.e. without the need to authorize again in „Login dialog“.
  It is a lower protection grade, not protecting running program against misuse of the third party.
- Before every protected function
  After running of any „SW and HW protected function“ client must authorize again in „Login dialog“ to his user account in „User list“.
  It is a higher protection grade, protecting local access to program functions anytime, i.e. even in case when currently logged-in client let program running and leave his computer.

„SW protected functions“ are the following:

- „Setting of program options“ – setting of program options as Folders, Display and Automatic data download.
- „Setting of communication“ – setting of communication devices and data loggers.
- „Clear display statistics“ – erasing of statistic data of active data logger in Display on bookmark display.

- „Clear alarms“ – erasing of alarm of active data logger on bookmark „alarms“.
- „Delete event viewer messages“ – erasing of messages in event viewer.

Access rights of client to those functions are defined in his user account. Logout of current client is enabled by selection „User Logout …“ from menu File.

4. Protection against illegal access to setting of data logger and limitation of configuration options in accordance with adjusted user rights

Limits access to setting and „HW protected functions“ only for clients defined in „User list“ stored in data logger in accordance with their rights. Way of definition of „User list“ for data logger is specified by setting „Use same security setting and user list for all data loggers“ on bookmark „Users and passwords“ in section „Security setting and user administration“, see appendix 2.

„Use same security setting and user list for all data loggers“ has the following meaning

- Enabled – defines „User list“ for all available data logger identically based on „User list“ for program and gives notice to client with administrator rights to the need of update of „User list“ in data logger, see figure 2.

Information
The users and passwords setting was changed.
Do you wish to update datalogger configuration now?
• Click on 'Yes' button updates configuration in every available dataloggers.
• Click on 'No' button lefts datalogger configuration without changes.
You will be warn to users and passwords update at next change of datalogger setting.
Yes
No

Figure 2: Prompt to update „User list“ stored in available data loggers

In case data logger does not contain any client in its configuration program gives notice to the need to activate „Communication data encryption by password“, see above and invites to enter the password, see figure 3.

Information
You are trying update users and passwords in datalogger 'Rada' and it means enable following posibilities in datalogger configuration:
• protection of access to HW functions
• communication data encryption by password
You will be asked to enter the password.
OK

Figure 3: Invitation to enter necessary password for encryption of communication data

In dialog setting of data logger at bookmark “Common setting” in section “Communication interface data logger“ is then enabled „Protection of access to HW functions“, but prohibited

editing of clients stored in data logger by „Users and passwords“ button see appendix 1.

Manual update of „User list“ stored in data logger from „User list“ for program is then enabled by selection “Update users and passwords in data logger“ from menu Configuration.

- Prohibited – definition of „User list“ stored in data logger is independent from „User list“ - for program it is necessary to define it in each data logger itself. Is activated by selection „Protection of access to HW functions“ and it is defined in dialog under „Users and passwords“ button, see figure 4.

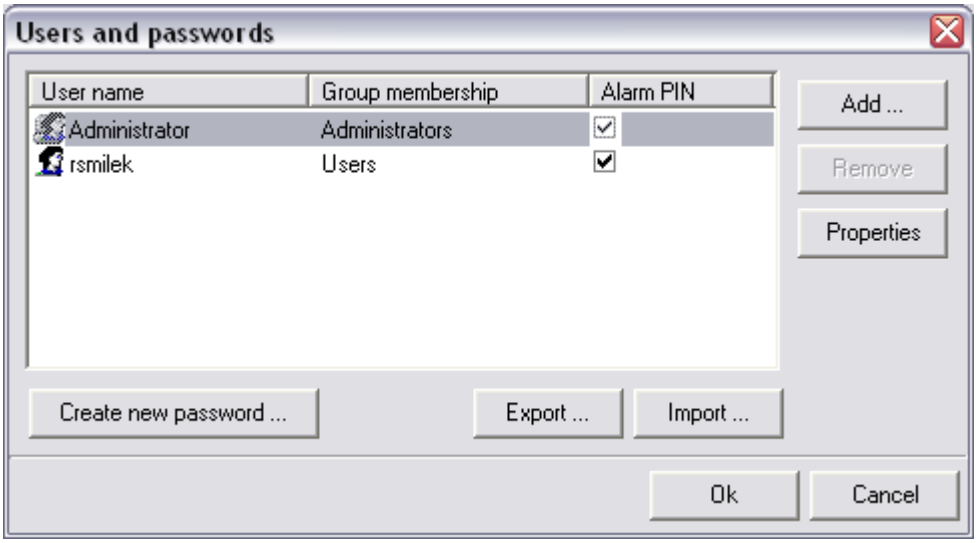


Figure 4 Dialog for editing of „Users and passwords“ stored in data logger

Manual update of “Update users and passwords in data logger“ from menu Configuration is disabled in this mode.

„HW protected functions“ of program are configuration functions for data logger. Access rights of client are defined in its user account. There are the following functions:

- „Download of record, erasing of memory, reset of counter inputs“

„Data logger setting“ – item from menu Configuration.

- „Alarm confirmation by PIN“ – PIN client for alarm cancel from keyboard of data logger or from program by selection of item „Deactivate internal acoustics or ALARM OUT signalization“ from menu Configuration. The necessity to enter PIN is defined by selection „PIN protection“ in setting of data logger at bookmark „Common setting“ in section „Confirmation of alarm signalization“

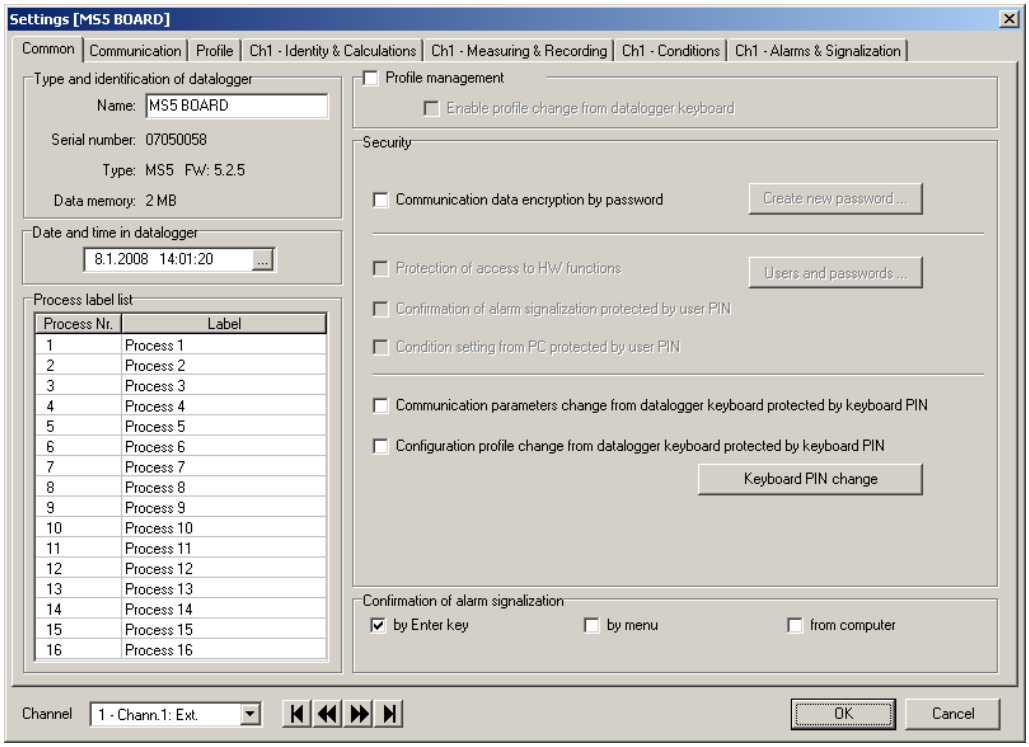
5. Administration of clients

From the above results the following:

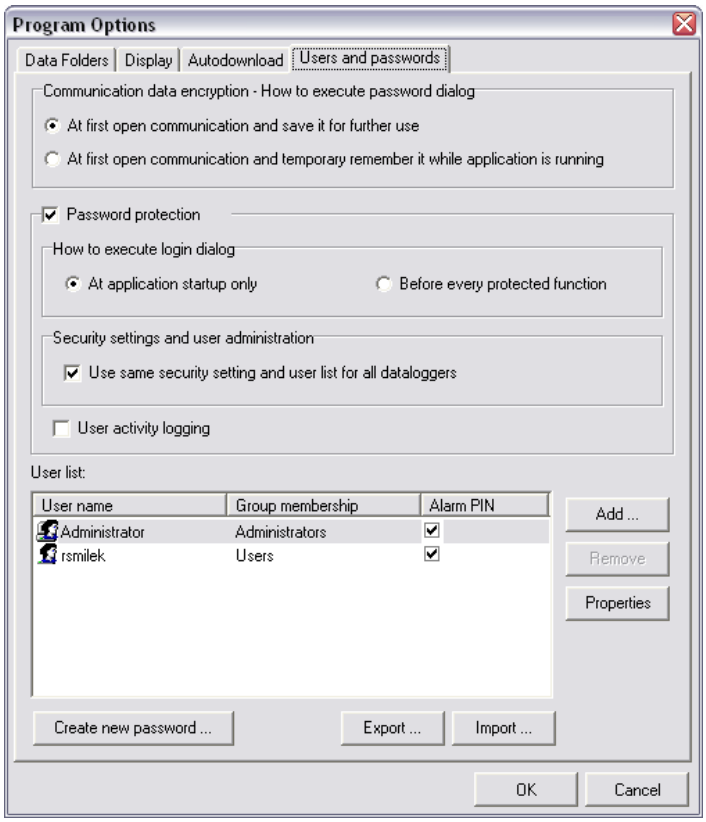
- Administration of clients and passwords in program is activated by selection „Password protection“ at bookmark „Users and passwords“ from menu program.
- Define available clients and theirs parameters in section „User list“ an the same bookmark - see paragraph 2 Administration of client. Editing of „User list“ is enabled only to client with rights of administrator.
- Critical for work on administration of clients is the selection of its mode, thus „Use same security setting and user list for all data loggers“ in section „Security setting and user administration“ at the same bookmark, see paragraph 4 Protection against illegal access to setting of data logger and limitation configuration of capability in accordance with setting of user rights.
  Note, there will be always two lists of clients - one stored in program and one stored in data logger.
  Selection mode „Use same security setting and user list for all data loggers“ determines the way to create and administer the client list in data logger.
  If this mode is active then program defines client list stored in data logger based on list of clients stored in program, i.e. as „User list“ at bookmark „Users and passwords“ in program options. ***Then program user is responsible*** for client list update in data logger by confirmation of the dialog from figure 2 or manually by selection “Update users and passwords in data logger“ from menu Configuration. Thus „Users and passwords“ button in section „Data logger communication interface“ becomes inactive in setting of data logger, see appendix 2.
  With favor it is possible to use this mode in smaller monitoring systems i.e. one control computer and several data loggers with maximum of 16 clients.

  If this mode inactive, then list of clients stored in program is independent from list of clients stored in data logger and program does not supervises its updating. List of clients stored in data logger is activated by selection „Protection of access to HW functions“ then defines in dialog under „Users and passwords“ button in setting of data logger, see appendix 1, figure 4.
  With favor it is possible to use this mode in larger monitoring systems i.e. several control computers and more networked data loggers with many clients. Here it is possible to divide clients to smaller groups (maximum of 15 clients) and define theirs access to data logger groups (by means of export and import of client list to the file) and at the same time to keep centralized administration by one administrator.
- Allowance of administration of clients requires allowance of encryption data in communication with data logger, see paragraph 1. Allowance of encryption must be specified before first storing of the client list to data logger.
- Deactivation of administration of clients is performed by switching off the selection „Password protection“ at bookmark „Users and passwords“ in program options, see appendix 2 and by switching off the selection „Protection of access to HW functions“ in section „Data logger communication interface“ in setting of data logger, see appendix 1.

Appendix:



Appendix 1 – Setting of data logger, bookmark Common setting



Appendix 2 – Program Options, bookmark Users and passwords